The psychological contamination of pro-environmental consensus: Political pressure for environmental belief agreement undermines its long-term power

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ABSTRACT

Is political pressure effective at producing pro-environmental action? While political pressure can have benefits, it may also sow the seeds for long-term backlash because it *psychologically contaminates* any emerging consensus. Three studies demonstrate the value of considering this *psychological contamination* perspective across three different environmental domains. Study 1 ($n = 151$) demonstrated that psychological contamination about climate science is a unique predictor of the likelihood of supporting both governmental and civilian action about climate change. Studies 2 ($n = 302$) and 3 ($n = 351$) used experimental scenarios to test psychological contamination's indirect role in the political pressure→contamination→rejection of governmental action chain. Using rainforest protection (Study 2) and recycling (Study 3), results provide support for the hypothesis that political pressure increases psychological contamination, which in turn decreases support for governmental action. We discuss implications of these findings for understanding Americans' lukewarm attitudes towards climate change action, and the ultimate success of pro-environmental policies more broadly.

In an effort to promote positive environmental change, those in authority positions sometimes use *political pressure* – strong-handed tactics that attempt to enforce pro-environmental change directly. But is political pressure effective at producing pro-environmental action? In the present paper, we aim to show across three studies that, while political pressure can have positive benefits, it also sows the seeds for long-term backlash because it psychologically contaminates any emerging consensus. This contaminated consensus makes it hard to sustain long-term cultural change. To illustrate, we first discuss one of those belief domains – climate change – as a representative example.

1. A representative example from climate change

The vast majority of scientists agree that anthropogenic activities have caused global warming and that its consequences are likely going to be severe. The oft-quoted figure that ninety-seven percent of climatologists agree with this interpretation of global warming research (Cook et al., 2016; Doran & Zimmerman, 2009) indeed suggests an astonishingly high amount of consensus[1] – particularly for a community

that is built upon dissent and debate.

Humans are highly influenced by perceptions of shared descriptive norms (for an example relevant to pro-environmental norms, see Fornara, Carrus, Passafaro, & Bonnes, 2011). Indeed, research specific to climate change beliefs supports the notion that consensus beliefs are important predictors of climate change beliefs (e.g., Ding, Maibach, Zhao, Roser-Renouf, & Leiserowitz, 2011; van der Linden, Leiserowitz, Feinberg, & Maibach, 2015) and that priming people with high levels of scientific consensus makes them more accepting of climate change (Lewandowsky, Gignac, & Vaughan, 2013). Accordingly, current best practices in the psychology of communicating climate change information often emphasize the scientific consensus. Consider this recommendation from van der Linden, Maibach, and Leiserowitz (2015, p. 762): "Government climate science agencies could improve efforts to highlight descriptive norms (e.g., the scientific consensus on human-caused climate change)." In very straightforward terms, then – and for good reason – researchers have increasingly begun to recommend communicating these high levels of consensus to the public.

One might expect that, given the power of consensus and the

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[1] "Consensus" can be measured and conceptualized in many different ways (see Conway & Schaller, 1998, for a summary). In the present article, we use "consensus" to mean the perception that there is a large amount of agreement in a given population on a particular idea or policy. As such, 97% would represent very high consensus (see Conway & Schaller, 1998).

increasingly publically-disseminated scientific consensus, climate change beliefs in the U.S. would have become more pro-environmental over the past twenty years. And to some degree that is true – and yet current levels of support do not seem to correspond very well to the ever-growing scientific consensus in the big picture. Indeed, despite increasingly ominous reports from official scientific bodies such as the *Intergovernmental Panel on Climate Change*, the American public has not reacted with increased concern on the issue. While 2016 polling data revealed that Americans' worry over global warming has grown in the very short term (64% of Americans were worried in 2016, compared to 51% in 2011) levels of concern in 2016 were still appreciably lower than they were in 2000 (72% of Americans were worried in 2000), and are nearly identical to the level of concern in 1989 (Saad & Jones, 2016). Although many factors may partially account for this (e.g., misinformation and selective exposure; see McCright, Charters, Dentzman, & Dietz, 2016; Ranney & Clark, 2016; van der Linden, Leiserowitz, Rosenthal, & Maibach, 2017), the fact remains that Americans' beliefs over the past twenty years far from reflect the emerging scientific consensus.

This presents a bit of a puzzle. If consensus is so powerful, then why are Americans not responding to this increasingly vast scientific consensus? Common answers focus on political biases (e.g. McCright & Dunlap, 2011; Guber, 2012; Vainio, Makiniemi, & Paloniemi, 2014; for a review of ideological influences on climate change, see; Pearson, Schuldt, & Romero-Canyas, 2016) and selective exposure (e.g. Feldman, 2016; Stroud, 2011; Dunlap & McCright, 2010, 2011). Conservatives are more likely to oppose climate change on ideological or biased grounds – and because they watch networks on which positive views of climate change are less likely to be discussed, it is possible that fewer of them are aware of the climate change consensus. Others have suggested ideologically-based conspiratorial thinking may be driving some conservatives to distrust consensus on climate change (Cook & Lewandowsky, 2016).

But while ideological biases such as selective exposure and ideologically-tainted misinformation surely account for some of the failure of the scientific consensus to make an impact, in this article, we examine an alternative reason which is distinct from ideology and apply that reason to climate change (and two other environmental domains). This reason is based on a set of linked phenomenon we refer to as *psychological contamination*.

2. Psychological contamination

While a lack of public awareness of the high degree of scientific consensus (e.g. Cook & Lewandowsky, 2016; Lewandowsky et al., 2013; van der Linden et al., 2015) may contribute to the puzzle of why Americans' beliefs do not reflect the scientific consensus, even when people are *aware of* scientific consensus, they may still fail to be *impacted* by it. Indeed, research demonstrates that the path from perceived consensus to its psychological impact is not always automatic and smooth. Many things can potentially psychologically *contaminate* that consensus, so that while it is recognized to exist, it does not have its intended impact. Those variables can be classified into two related processes: *Informational* contamination and *emotional* contamination (Conway & Schaller, 2005; Conway & Schaller, 2007; Conway et al., 2009; Conway, Houck, & Repke, 2017).

First, the impact of consensus is based in part on an assumption that the persons comprising the consensus arrived at it in a way devoid of outside influences that might artificially produce forced agreement. If the consensus appears to be the result of such seemingly artificial influences, then it will be cognitively dismissed (Conway & Schaller, 2005; Conway & Schaller, 2007; Conway et al., 2009; Conway, Houck, & Repke, 2017; see also Fein, Hilton, & Miller, 1990; Fein, 1996). This process we refer to as *informational contamination*. Second – and relatedly – psychological contamination of the consensus can occur because of emotional reactance: People may feel pressure to engage in the

consensually-shared behavior or belief, and as a result may desire to re-establish their own freedom (for discussions, see Conway & Schaller, 2005; Conway & Schaller, 2007; Conway et al., 2009; Conway, Repke et al, 2017; Knowles & Linn, 2004). This process we refer to as *emotional contamination*.

Informational and emotional forms of psychological contamination are distinct and sometimes show divergent effects (Conway & Schaller, 2005; Conway et al., 2017). For example, if a powerful authority figure engages in a '*softer, kindly-spoken*' pressure, it will still cause informational contamination because it makes it appear as if the consensus emerged due to the potential influence of the authority figure. But the softer-toned pressure will cause comparatively less emotional contamination because emotional reactance is more dependent on a negative emotional tone being expressed (Conway & Schaller, 2005).

Although they are distinct processes, informational and emotional contamination share many similarities as well. Given their conceptual overlap, it is unsurprising that they are generally modestly positively related (Conway et al., 2009, 2017). Indeed, in most situations where authority pressure is not clearly kindly-delivered, both emotional and informational forms of contamination show essentially identical results (Conway & Schaller, 2005; Conway et al., 2009). In the present work, we focus exclusively on situations where authority figures impose top-down pressures in a manner that is not kindly-delivered. As a result, we expect in the present work that political pressure will affect both informational and emotional forms of contamination identically. Thus, we treat them together.

Considering both forms of psychological contamination suggests an important set of mechanisms by which the perception of a pro-environmental consensus may be rendered powerless in the minds of the perceivers. Awareness of consensus is indeed a starting point for belief change – which is why this technique is often recommended – but awareness is not enough. People can be aware of the consensus and yet believe that all or part of the consensus was artificially created – and, as a result, they may both informationally discount and feel residual emotional reactance towards that consensus.

3. What causes psychological contamination? How political pressure sows the seeds of its own undoing

What might cause psychological contamination with respect to perceived consensus about pro-environmental beliefs? While there may be a tendency to think that the primary cause of contamination is increased skepticism of liberal political agendas on the part of political conservatives, such a view might narrow our psychological understanding too far. The broader lens of psychological contamination reveals that *anything* publicly indicating a real possibility of contamination could undermine the value of consensus in all persons, regardless of political ideology.

One specific possibility suggested by psychological contamination – and past research – involves top-down political pressures from governmental officials or policies to manufacture consensus. Ironically, efforts to manufacture consensus from the top-down can sow the psychological seeds of their own undoing. For example, research with business scenarios shows that when business leaders attempt to force their employees to engage in a particular behavior, they can succeed in the short term – but if the context changes, their heavy-handed approach ultimately backfires and leads to more deviance instead (Conway & Schaller, 2005). Similarly, if *political correctness* norms designed to keep people from talking negatively are made too salient, people will engage in those norms when they feel like they are required to – but in a new context, the prior presence of those *positive speech* norms will actually lead to more *negative* communications about groups (Conway et al., 2009). In both cases, this happens in part because perceivers believe the consensus produced by the leader or norm is *artificially manufactured* – and therefore it both robs the consensus of its informational power and makes people emotionally upset at the
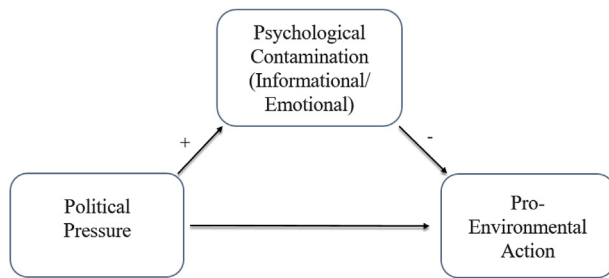
Fig. 1. Proposed psychological contamination model: Indirect effect of political pressure on pro-environmental action *Through* psychological contamination.

potential for manipulation. If we see a descriptive consensus on some behavior, all else being equal we will (as research demonstrates; see Lewandowsky et al., 2013) be influenced in the direction of the consensus to believe the behavior is good. But if we perceive it was artificially manufactured, we may engage in the behavior when we feel forced to do so – but we will not believe the consensus exists for any "good" reason, and we will feel residually upset about it emotionally. It will be *contaminated*.

4. The present studies: Implications for climate change, rainforest, and recycling policies

The present studies apply this psychological contamination perspective to three separate domains of environmental policies: Climate change, the protection of rainforests, and recycling. We test this perspective on these belief domains in Studies 1, 2, and 3 respectively. In all studies, participants read about a consensus for pro-environmental positions that is very high ($> 95\%$).

According to our Psychological Contamination Model – presented in Fig. 1 – we expect that top-down political pressure will cause people to feel more of both forms of psychological contamination (informational contamination and emotional contamination), and this contamination in turn will cause people to be less likely to engage in pro-environmental behaviors.

In Study 1, we apply this model to evaluate whether or not a psychological contamination perspective helps us better understand the puzzle we presented above – why Americans have yet to embrace the scientific consensus on climate change. While, as previously illustrated, part of the reason has to do with ideological biases or lack of awareness (e.g. Cook & Lewandowsky, 2016; Lewandowsky et al., 2013; van der Linden et al., 2015), we do not believe that is the whole story. We propose that part of the reason for this disconnect may be that, when consensus is perceived, it is viewed as contaminated because it appears to result from an artificially manufactured source – top-down political pressures – and thus does not (in the minds of perceivers) represent the independent judgments of truth-seeking scientists. If climate scientists want to change the minds of the populace, it is possible that one of the obstacles we need to overcome is to remove psychological contamination. To do that, we first must identify it and begin to understand its source. Thus, in Study 1 we demonstrate in a U.S. sample that psychological contamination about climate science is a unique predictor of the likelihood of supporting both governmental and civilian action about climate change. Importantly, this effect of psychological contamination remains significant even when accounting for several political ideology variables. Study 1 does not directly test the entire Political Pressure(X)→Contamination(M)→Rejection of Governmental Action(Y) model, but rather specifically focuses on one part of it: The relationship between informational contamination (M) and pro-environmental action (Y).

Studies 2 and 3 build on Study 1 in three important ways. (1) In both Studies 2 and 3, we aim to understand potential causes of psychological contamination by directly manipulating political pressure

relevant to environmental attitudes via experimental analogs. These analogs demonstrate that perceptions of political pressure ultimately may undermine the very policies they are attempting to create – that the act of publically putting political pressure for endorsement of a policy indirectly (but powerfully) leads to a psychological rejection of that policy in a new context. Thus, we use analogs to test the proposed X (political pressure)→M (psychological contamination)→Y (rejection of governmental action) pathway, where we expect political pressure to exert an indirect effect on ultimate rejection of governmental action *through* psychological contamination. As such, Studies 2 and 3 test the whole proposed model within each study. (2) Studies 2 and 3 each provide evidence from different domains of environmental beliefs – rainforest protection and recycling – thus demonstrating a greater scope of influence of a psychological contamination perspective. Further, not only do Studies 2 and 3 use different domains of belief from each other, they also use different manipulations of political pressure (pressure from a president in Study 2, existence of a heavy-handed law in Study 3). This is important, because such conceptual replication using different domains and different manipulations – which are tied together by an underlying model – demonstrates empirical triangulation (see Conway, Houck, & Gornick, 2014; Crandall & Sherman, 2016). (3) Finally, whereas Study 1 focuses only on one form of psychological contamination (informational contamination), Studies 2 and 3 expand this to include emotional forms of contamination as well. As will be seen, both forms of contamination show the same pattern (as expected by prior research; Conway et al., 2017).

5. Study 1 method

5.1. Overview and participants

One-Hundred and Fifty One *Mechanical Turk* participants (mean age = 37; 48% female; ethic group breakdown: 79% Caucasian, 7% African American, 5% Latina/Latino, 5% Asian; mean *political conservatism* score = 4.2) received monetary compensation for participating. We chose *Mechanical Turk* in part because it has been validated for use as a representative sample for research related to political beliefs (see, e.g., Clifford, Jewell, & Waggoner, 2015) and generally shows similar results as other samples (for examples, see Conway et al., 2017; Houck, Conway, & Repke, 2014). All participants resided in the United States and completed survey questions relevant to psychological contamination, support for legal and citizen action, and political ideology.

5.2. Independent measure: Informational contamination

Participants were first presented with a description of climate change consensus:

Scientific researchers have found that about 97 percent of climatologists who are active publishers on climate change agree that human activity is pumping CO2 into the atmosphere at a rate and volume that is causing drastic changes to the earth and its atmosphere (Doran & Zimmerman, 2009). Here is the citation for the research study:

Doran, P.T. & Zimmerman, M.K. (2009). Examining the scientific consensus on climate change. EOS, 90(3), 22–23.

Participants were then asked four informational contamination questions concerning how they viewed that consensus anchored on a 1–7 (agree/disagree) scale. For example, one question read: "I believe that the 97% agreement exists because there is a larger political agenda that puts pressure on scientists to conform to the views endorsed by the agenda." (The entire questionnaire can be found in the supplementary materials accompanying this manuscript). Participants similarly rated the degree that political bias had produced the figure, that the figure represents that scientists

independently evaluated evidence (reverse-scored), and that it represents truth-seeking in scientists (reverse-scored).

We converted these four items to *z*-scores and averaged them into a single *Informational Contamination* measure (*alpha* = .86), where higher scores represent more contamination.

5.3. Dependent measures

Support *for Governmental Action for Climate Change.* We asked participants four questions related to how much they would support governmental action for climate change (two of which came from the Six Americas questionnaire, Maibach, Leiserowitz, Roser-Renouf, Mertz, & Akerlof, 2011; see Supplementary materials for all items and sources): Two items pertained to the priority our government should place on global warming and two items pertained to support for tougher environmental legislation regarding climate change. We converted these four items to *z*-scores and averaged them into a single *Climate Change Governmental Action* Support measure (*alpha* = .86).

Support *for Citizen Action for Climate Change.* Participants also completed three items related to how much they believe private citizens should engage in climate change related action (two of which came from the Six Americas questionnaire, Maibach et al., 2011; see Supplementary materials for all items and sources). We converted these items to *z*-scores averaged them into a single *Climate Change Citizen Action* (*alpha* = .77).

5.4. Covariate: Political ideology

In order to show (in line with prior research; e.g., Conway et al., 2017) that informational contamination has a unique effect above and beyond standard measurements related to *political conservatism*, we controlled for three ideology-related measurements: A standard two-item self-identification of *Political Conservatism* (see, e.g., Conway et al., 2015; Conway, Houck, Gornick, & Repke, 2016; Conway et al., 2017), a three-item short version of the Right-Wing Authoritarianism questionnaire (RWA; taken from Altemeyer, 1996), and the 16-item Social Dominance Orientation questionnaire (Pratto, Sidanius, Stallworth, & Malle, 1994).[2]

We first examined the zero-order relationship between informational contamination and support for climate change action. As can be seen in Table 1, results are consistent with a psychological contamination perspective. Participant beliefs that the scientific consensus was informationally contaminated inversely predicted their likelihood of supporting strong governmental legislation to curb climate change and the actions of private citizens for fighting climate change (*p*'s < 0.001).

We next computed hierarchical regressions entering all three political conservatism measurements at Block 1 (both Block 1 R^2 scores > 0.29) and informational contamination at Block 2 (both Block 2 R^2 scores > 0.44, R^2 *Change* scores > 0.08, R^2 *Change p's* < 0.001). As can be seen in Table 2, these results revealed that informational contamination was a unique predictor of governmental and citizen support for action on climate change (Block 2 informational contamination *p*'s < 0.001).

6. Study 1 discussion and transition

Taken together, these results are consistent with an informational contamination perspective: *Doubting the sincerity of perceived consensus* uniquely affects one's likelihood of endorsing governmental and civic action for climate change. It does so above and beyond one's own

political affiliations, right-wing authoritarianism, and social dominance.

This study suggests the real-world predictive value of contamination in one domain of environmental belief. However, it does not (a) illuminate its role in the larger causal chain discussed earlier, nor does it (b) necessarily apply widely to other related environmental beliefs. Study 1 thus provides evidence of the unique predictive validity of psychological contamination on support for governmental legislation and civic action (the M→Y relationship in the proposed X→M→Y chain) on one domain, but leaves many questions unanswered. Studies 2 and 3 aim to help fill in these gaps. Using an experimental approach, these studies provide evidence of psychological contamination's indirect role in the political pressure→psychological contamination→rejection of governmental action chain on additional environmental domains.

7. Overview of study 2 and 3 approach

Both Study 2 and 3 present participants with a scenario in which they will ultimately be asked to support or oppose specific legislation related to the environment. In both studies, a consensus emerges in favor of a pro-environmental position (96% in Study 2; 97% in Study 3). Also in both studies, we manipulate whether or not there is political pressure to engage in the pro-environmental position: In Study 2, this manipulation involves pressure from a powerful governmental leader, while in Study 3 it involves the presence of a law enforcing recycling.

Our primary hypothesis in both studies is that political pressure will create informational and emotional contamination, which in turn will reduce the likelihood that people will support a law. Thus, we expect political pressure to operate on participants' ultimate support of a pro-environmental law *through* both informational and emotional contamination. The clearest test of this causal path is the indirect effect of political pressure on law support via psychological contamination measurements.

It is important to note that meaningful indirect effects of X→Y through M can occur even when there is no simple X→Y relationship (see Darlington & Hayes, 2017; Hayes, 2009; Hayes & Rockwood, 2017). Our perspective necessarily implies that this indirect effect should be in evidence; it does not always imply that a simple X→Y effect will occur. Whether or not that simple effect occurs is the result of many contextual factors. Regardless, the key test involves the indirect effect of X→Y *through* contamination. We will return to what this means in the general discussion.

8. Study 2 methods

8.1. Overview and participants

Three-hundred and ninety-eight *Mechanical Turk* participants (mean age = 39; 54% female; ethic group breakdown: 79% Caucasian, 8% African American, 6% Asian, 4% Latina/Latino) received monetary compensation for participating. All participants resided in the United States. Immediately after reading the scenario, participants were asked three memory-check questions about aspects of the scenario (e.g., did the president favor the law in question). Participants that failed one or more of these questions were removed, leaving three hundred and ten for analyses. (We also performed key analyses on the entire sample prior to exclusion, and these analyses were essentially identical, both descriptively and inferentially, as those excluding participants. Therefore, we do not discuss this issue further.)

8.2. Manipulation of government pressure

Information Common Across All Conditions. Participants were randomly assigned to read one of two scenarios. In all conditions, the scenarios contained the following elements: (1) Participants were asked

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[2] Participants also completed ancillary measurements of climate change and recycling beliefs. Analyses on these measures are presented in the supplementary materials.

Table 1
Study 1: Correlation matrix.

	1	2	3	4	5	6	7	8	9	10	11
1. Contamination	(.86)										
2. Support Gov. Climate	-.62	(.86)									
3. Support Cit. Climate	-.64	.73	(.77)								
4. Support Gov. Recycle	-.39	.58	.53	(n/a)							
5. Recycling Favorability	-.12	.32	.30	.53	(n/a)						
6. Political Conservatism	.53	-.54	-.49	-.36	-.25	(.93)					
7. RWA	.52	-.46	-.45	-.27	-.20	.58	(.63)				
8. SDO	.41	-.48	-.35	-.21	-.09	.36	.39	(.95)			

Note: $N = 151$. (Diagonal) = standardized *alpha* for the scale. "Contamination" = Informational Contamination; "Support Gov. Climate" = Support for Governmental Action on Climate Change; "Support Cit. Climate" = Support for Citizen Action on Climate Change; "Support Gov. Recycle" = Support for Government Legislation on Recycling; "RWA" = Right-Wing Authoritarianism; "SDO" = Social Dominance Orientation. Study 1 Results.

Table 2
Study 1: Primary hierarchical regressions: Informational Contamination's incremental additive prediction of support for climate change (political conservatism at block 1).

	Block 2 *beta*	Block 2	Block 2
	Contamination	*t*-value	*p*-value
Climate Change			
Government Action	-.37***	− 4.74***	< .001
Citizen Action	-.48***	− 6.01***	< .001

Note: $N = 151$; ***$p < .001$; **$p < .01$; *$p < .05$. Block 2 *beta* = standardized *beta* for informational contamination's incremental prediction value over and above political conservatism measures in Block 2; Block 2 *t*-value = *t*-value at Block 2 for informational contamination; *p*-value = *p*-value at Block 2 for informational contamination.

to imagine they were a member of the legislature of the nation of Suriname (a nation used because North Americans generally know little about it; see, e.g., Maio & Esses, 1998). (2) Some basic facts about both the ecology and economy of Suriname were presented. (3) Participants were informed they are going to have to vote on a key issue which would be a radical change from existing policy – this change would protect 60% of the rainforest of Suriname from business development. (4) Studies from three universities about the consequences of the new law provide mixed results: It seems many people in participants' district would lose their jobs, but there might be benefits to eco-tourism and the environment. (5) The president, who is depicted as a powerful person, calls an assembly of legislators to give a speech. (6) Immediately after the speech, almost all of the legislators (48 out of 50, or 96%) publically argue in favor of the new law, creating a clear consensus in its favor. (7) After that point, the president is depicted as leaving office permanently for unknown reasons.

Political Pressure Manipulation. It is during the speech itself that the manipulation occurs. Participants in the *Political Pressure* condition read that the president essentially orders them to vote for the law, on threat of his personal retaliation. Participants in the *No Pressure* condition read a speech of equivalent length and structure where the president encourages them to vote their conscience without giving his own opinion.

8.3. Main dependent measures

Voting Intent: Support *for the Pro-Environmental Law.* We asked participants three questions related to their likelihood of voting for the new law in the scenario. First, we asked a dichotomous *vote for* or *not vote for* question. Second and third, we asked participants on a 1–9 scale about their likelihood of voting for and against the law, respectively. These last two were highly correlated and thus we reverse-scored the "voting against" likelihood and averaged it with the "voting for" likelihood. We originally analyzed the dichotomous measure and the continuous measure separately and the results are very similar for both. For ease of

presentation, we opted to convert both to *z*-scores and combine them into a single *Voting Intent* measure (*alpha* = .95).

Private Support *for the Law.* Participants also completed two 1–9 rating scale items relevant to their own personal beliefs about the law – specifically, the degree that the privately believed the law would be good for Suriname overall, and for the Suriname economy, respectively. These items were combined into a single *Private Law* Support measure (*alpha* = .74).

8.4. Psychological contamination measures

In Study 1, we focused on only the cognitive/informational part of psychological contamination, while not evaluating the residual emotional component. In Study 2, we measured both informational and emotional contamination by adapting measurements from prior research (Conway & Schaller, 2005; Conway et al., 2009, 2017).

Informational Contamination. To measure informational contamination, we adapted three items used in previous research scenarios to measure the construct (Conway & Schaller, 2005; Conway et al., 2009). Informational contamination items (anchored on a 1–9 scale) were: "At the assembly where everyone spoke in favor of the law, to what degree do you think the unanimous discussion in favor of the law occurred because the law is, in reality, good for the country?" (reverse-scored); "At the assembly where everyone spoke in favor of the law, to what degree do you think the unanimous discussion in favor of the law occurred because each legislator really privately believed that the law was good for the country?" (reverse-scored); and "At the assembly where everyone spoke in favor of the law, to what degree do you think the unanimous discussion in favor of the law occurred because of the influence of the President?"

These items were averaged into a single *informational contamination* measure (*alpha* = .81).

Emotional contamination. To measure emotional contamination, we adapted three items from previous research used to measure emotional reactance (Conway & Schaller, 2005; Conway et al., 2009, 2017). Emotional contamination items (anchored on a 1–9 scale) were: "In the scenario, to what degree did the President's discussion at the meeting make you feel as if he was trying to take away your freedom to do exactly as you wished?"; "In the scenario, to what degree did the President's discussion at the meeting make you want to do the opposite of what he said, just to show him that you could not be told what to do?"; and "In the scenario, to what degree did the President's discussion at the meeting make you upset?"

These items were averaged into a single *emotional contamination* measure (*alpha* = .81).

Cumulative Psychological Contamination Measurement. We initially analyzed the informational and emotional contamination measurements separately. Those measurements showed results identical, both descriptively and inferentially, for both measurements. Because the measurements were fairly strongly correlated in this sample ($r = 0.55$)

and because, from a theoretical point of view, we would expect the two measurements to show the same pattern in this paradigm (see Conway & Schaller, 2005; Conway et al., 2009), we opted to produce a combined measurement by converting both measurements to *z*-scores and averaging them into a cumulative *psychological contamination* score (*alpha* = .86). We present this measurement below. However, when each measurement is analyzed separately, all key significant results remain significant for each individual measure at the *p* < .0001 level – thus, this combined measurement does not change the basic story presented here.

In combining the variables, we recognize that they are distinct factors. However, things that are conceptually related can still be distinct (see, Houck, Conway, & Gornick, 2014, for a discussion). In this case, although different factors, both informational and emotional forms of contamination are related to the larger psychological contamination perspective discussed here. As such, combining them provides a straightforward way of testing their cumulative impact. However, it is worth remembering that regardless of whether keeping them separate or analyzing them together, informational and emotional contamination show the exact same results. As such, this issue does not directly affect the larger conclusion drawn from this manuscript.

8.5. Covariate: Political ideology

We included the same two-item *political conservatism* used in Study 1 as a covariate in all analyses (*M* = 4.1).

9. Study 2 results and discussion

Our primary hypothesis is that governmental pressure indirectly operates on voting intent and private beliefs about the law through psychological contamination. To test this, we followed recommended current practices for testing indirect effects (see Darlington & Hayes, 2017; Hayes, 2009; Hayes & Rockwood, 2017). Specifically, we used the PROCESS macro (Hayes, 2013) to compute both normal tests of indirect effects and bootstrapped confidence intervals (using 5000 samples) for each X→Y indirect effect with psychological contamination as the M variable. (In all analyses, we controlled directly for political conservatism.)

Figs. 2 and 3 report our primary analyses. As can be seen there, both normal tests (which were used to compute *p*-values for indirect effects) and 95% confidence intervals tell a story consistent with our primary hypothesis: Political pressure from the president indirectly impacted both voting intention towards the law and private beliefs about the law (all indirect effect *p*'s < 0.0001). Descriptive analysis of this path shows exactly what our hypothesis predicts: Political pressure significantly increases psychological contamination, which in turn significantly decreases support for the law (see Figs. 2 and 3).
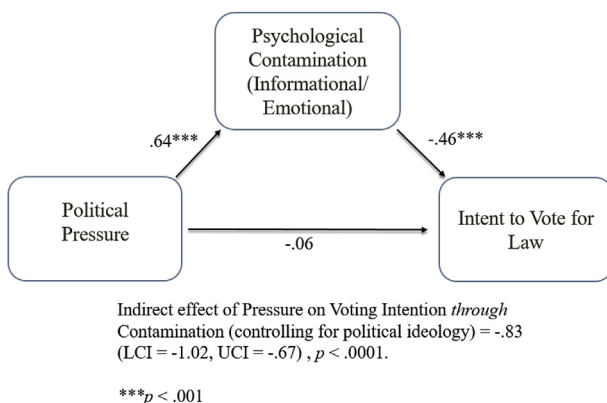
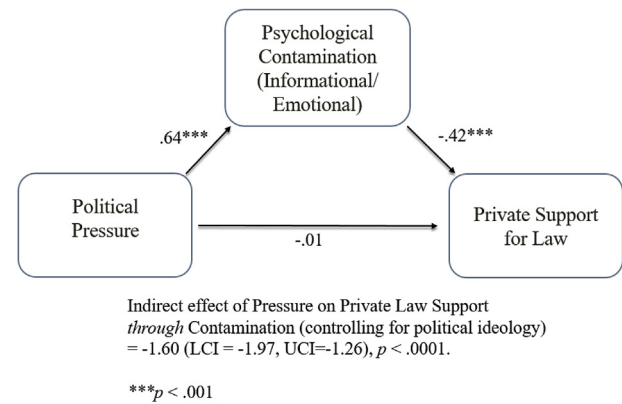**Fig. 2.** Study 2: Political pressure on voting intention *Through* psychological contamination.

Fig. 3. Study 2: Political pressure on personal beliefs about the law *Through* psychological contamination.

Study 3 builds on these results by conceptually replicating Study 2 with two differences (see Crandall & Sherman, 2016, for a discussion of the importance of conceptual replication): (1) Study 3 used a different cue for political pressure (salient presence of an existing law), and (2) Study 3 used a different domain of environmental belief (recycling).

10. Study 3 methods

10.1. Overview and participants

Four-hundred and sixty-four *Mechanical Turk* participants (mean age = 37; 52% female; ethic group breakdown: 83% Caucasian, 7% African American, 5% Latina/Latino, 3% Asian) received monetary compensation for participating. All participants resided in the United States. Immediately after reading the scenario, participants were asked three memory-check questions about aspects of the scenario. Participants that failed one or more of these questions were removed, leaving three hundred and fifty-one for analyses. (We also performed key analyses on the entire sample prior to exclusion, and these analyses were essentially identical, both descriptively and inferentially, as those excluding participants. Therefore, we do not discuss this issue further.)

10.2. Manipulation of government pressure

Information Common Across All Conditions. Participants were randomly assigned to read one of three scenarios (one scenario involved political pressure; two scenarios involved no-pressure control conditions which were later combined into one condition, described below). In all conditions, the scenarios contained the following elements: (1) Participants were asked to imagine they had moved to a small Suriname town called Brownsweg. (2) In Brownsweg, there is visible evidence everywhere that people recycle a lot, and you find out that survey data suggests 97% of the people recycle. (3) At the end of the scenario, participants are asked to imagine that they moved to a different town on the other side of Suriname, where they will be asked to vote on a law requiring everyone to recycle.

Political Pressure Manipulation. Political pressure was manipulated in the scenario by manipulating whether or not a law requiring recycling was present or absent. In the *Political Pressure* condition, participants were told that a law exists (made salient to everyone via signs all over town) requiring recycling. Further, to ensure participants did not interpret this law as kindly-valenced, the Mayor is depicted as owning a recycling company and it seems people in the town are afraid to cross him. Participants in *No Pressure* conditions read one of two different paragraphs instead: They were either told (1) the town had a long history of self-expression and debate that valued all sides of an issue or (2) that the town's citizens *seem* to be responding to environmental problems as a result of corporate pollution that has historically hurt the

town. For the present purposes, these two different no-pressure conditions are similar, and thus they were combined in analyses into one *No Pressure* group.[3] Thus, all analyses reported below compared two groups: *Political Pressure* versus *No Pressure* groups.

10.3. Main dependent measures

All dependent measures for Study 3 were either directly identical to (or adapted to be parallel to) those from Study 2. For law support, we asked participants questions related to their likelihood of voting for the new law in the scenario and combined them into a single *Voting Intent* measure (*alpha* = .92) in a manner identical to Study 2.

Private Support *for the Law.* Participants also similarly completed two 1–9 rating scale items relevant to their own personal beliefs about the law. These items were combined into a single *Private Law* Support measure (*alpha* = .83).

10.4. Psychological contamination measures

We adapted the informational contamination items to focus on their views of the likelihood that the consensus in the town in favor of recycling laws reflected the top-down influence of the mayor as opposed to the goodness of the law itself, and similarly adapted the emotional contamination items from Study 2. Informational contamination items (anchored on a 1–9 scale) were: "In Brownsweg, do you think the nearly-unanimous expressed support in favor of the law occurred because the law is, in reality, good for the town?" (reverse-scored); "In Brownsweg, to what degree do you think the nearly-unanimous expressed support in favor of the law occurred because each legislator really privately believed that the law was good for the town?" (reverse-scored); and "In Brownsweg, to what degree do you think the nearly-unanimous expressed support in favor of the law occurred because of the influence of the Mayor and the town council?" Emotional contamination items (anchored on a 1–9 scale) were: "In the scenario, to what degree did the laws of Brownsweg make you feel as if the town council was trying to take away your freedom to do exactly as you wished?"; "In the scenario, to what degree did the laws of Brownsweg make you want to NOT recycle, just to show the town that you could not be told what to do?"; and "In the scenario, to what degree did the laws of Brownsweg make you upset?"[4]

In a manner identical to Study 2, we constructed aggregate measurements for *informational contamination* (*alpha* = .57)[5] and *emotional*

contamination (*alpha* = .85). As in Study 2, informational contamination and emotional contamination were fairly strongly correlated ($r = 0.70$), and thus we constructed a cumulative *psychological contamination* measure in a manner identical to Study 2 (*alpha* = .85). As in Study 2, we initially analyzed these two measurements separately and doing so revealed an identical inferential and descriptive story as the cumulative measurement, with all key tests showing $p < .0001$ for all effects for each measure analyzed separately. We again focus on the cumulative measure of *psychological contamination* for ease of presentation.

10.5. Covariate: Political ideology

We further included the same *political conservatism* measure from Studies 1 and 2 as a covariate ($M = 3.9$).

11. Study 3 results and discussion

As with Study 2, our primary hypothesis is that political pressure indirectly operates on voting intent and private beliefs about the law through psychological contamination. We followed the same recommended current practices for testing indirect effects as we followed in Study 2 (see Darlington & Hayes, 2017; Hayes, 2009; Hayes & Rockwood, 2017). As in Study 2, in all analyses, we controlled directly for political conservatism.

Figs. 4 and 5 report our primary analyses. As can be seen there, both normal tests (which were used to compute p-values for indirect effects) and 95% confidence intervals tell a story consistent with hypotheses (and with Study 2): Political pressure from the law indirectly impacts both voting intention towards the new law and private beliefs about the law (all indirect effect p's < 0.0001). Descriptive analysis of this path shows exactly what our hypothesis predicts: Political pressure significantly increases psychological contamination, which in turn significantly decreases support for the law.

12. General discussion

Taken together, these results demonstrate the potential value of considering psychological contamination in the present cultural narratives about climate change, rainforests, and recycling. Study 1 shows that informational contamination of scientific consensus is a unique predictor of Americans' likelihood of supporting governmental and civic action in response to climate change. Studies 2 and 3 demonstrate that political pressure to engage in rainforest preservation and recycling policies may psychologically sow the seeds of its own destruction – and it is doing so (in part) because of its effect on both informational and emotional contamination.

12.1. The tension between enacting governmental change and psychological contamination

Governmental policies are often the most effective and sweeping way to enact change. A lot of work demonstrates that group consensus can effectively be manufactured from the "top down" as a result of obvious external pressures including, but not limited to, political pressure (see, e.g., Berger & Heath, 2005; Cavalli-Sforza, 1993; Conway & Schaller, 2007; Milgram, 1974). But the present research suggests

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[3] We originally included separate no-pressure conditions to explore more nuanced differences among these control conditions that are beyond the scope of the present manuscript (see Conway et al., 2017, for a similar strategy). However, for key findings here, we also analyzed these two No Pressure conditions separately – doing so did not change basic story presented in the text.

[4] For both Studies 2 and 3, we also asked participants two open-ended questions pertaining to why they made the decision they did and why they believed the consensus in the scenario emerged. We used these as needed for qualitative understanding (see footnote 5 below).

[5] This lower alpha could reflect a confusion on the part of some participants in the way the informational contamination questions were worded. Instead of asking them about their interpretation of the town's support of *recycling*, we asked instead about the town's support of the recycling *law*. These three questions largely captured the spirit of informational contamination but were technically inaccurate: The people of Browsweg in the scenario did not formally support a recycling *law* in any of the conditions – they instead publically supported *recycling* in all conditions. However, two things make us unconcerned about this technical wording inaccuracy: (1) We also asked a similar open-ended question about why the people of Brownsweg did or did not support the law, and reading those participant responses suggested that, while some participants directly pointed out that the question was inaccurate, the majority of participants appeared to interpret the question in the spirit it was intended. (2) If this were to have an adverse impact on our study, the most likely impact would be to create noise that would make it harder to find a real effect; it would

(footnote continued)

be unlikely to create an effect artificially. Because we did in fact find an effect as predicted, it seems unlikely that this wording inaccuracy is a problem for Study 3. This, combined with similar results from Study 2 (both contamination measures) and Study 3 (emotional contamination measure) where no possible wording inaccuracies can come into play, points to the interpretation offered in the main body of the manuscript.

Indirect effect of Pressure on Voting Intention *through*
Contamination (controlling for political ideology) = -.50
(LCI = -.67, UCI = -.36) , *p* < .0001.

***p < .001

Fig. 4. Study 3: Political pressure on voting intention *Through* psychological contamination.

Indirect effect of Pressure on Private Law Support *through*
Contamination (controlling for political ideology) = -1.02
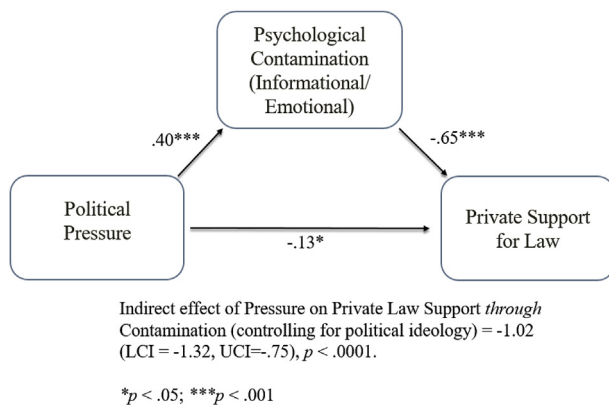(LCI = -1.32, UCI=-.75), *p* < .0001.

*p < .05; ***p < .001

Fig. 5. Study 3: Political pressure on personal beliefs about the law *Through* psychological contamination.

that top-down political pressures may come at a cost – while they may work as long as enforcement is directly possible, in the long term they also plant a seed that might destroy the very thing they sought to create. After all, governmental policies can be revoked just as they can be enacted. The savvy political agent does not just want to enact a policy – they want to ultimately change a culture. This may be especially important in democratic societies because research suggests that there is ultimately a stronger bond between the cultural milieu and the legal system in low-autocracy regions (Chan & Conway, 2018).

The present work suggests that accomplishing that goal can be undermined by too-visible markers of political pressure. This puts the hopeful agent of change in a tricky spot. The process of enacting legislation through political pressure necessarily produces the possibility of psychological contamination. Descriptive norms in favor of a policy (e.g., consensus of climate scientists about climate change) will be of less value if people perceive they are the result of a manufactured political agenda or political pressure. That sense of manufacturing comes in part from perceptions of too-visible political agents or laws.

Thus, in enacting any change, hopeful change agents need to be aware that informational and emotional contamination are potential costs that have to be considered and overcome. This suggests two principles not directly tested in the present work – but which future work would do well to test directly. (1) Do not highlight successful laws and policies unless it is necessary to enforce them. In an ideal world, people engage in good environmental behavior without enforcement, so to the degree that is already happening, do not interfere or over-pressure. (2) Do not denigrate opponents. Denigration only increases the likelihood of psychological contamination. Public arguments that are condescending may mobilize true believers, but they create the possibility of contamination in the very large masses of undecided persons

that they ultimately must win over to enact lasting change.

12.2. Limitations of the present work

This research is not without some limitations. First, Studies 2 and 3 used fictitious scenarios. While this is not a unique criticism of this work and low-external validity studies have many benefits (see, e.g., Mook, 1983), future research would do well to examine these processes in more real-world situations. Second, this work was conducted entirely on U.S. samples. We do not claim that these effects would necessarily occur in the same manner in other places – future research should evaluate that question more closely.

Further, Studies 2 and 3 showed inconsistent simple effects of governmental pressure on support for environmental policies in the scenarios. Only one of the four tests showed a significant reduction in policies for the simple X→Y relationship (that for private support of the law in Study 3). Thus, we did not consistently capture a straight reduction in beliefs or intentions towards the laws in Studies 2 and 3. However, it is important to note that our psychological contamination perspective clearly predicts an indirect effect of X→Y *through* contamination, and that all of those tests showed significant support for our hypothesis. These tests are not invalidated by the lack of a simple X→Y relationship (Darlington & Hayes, 2017; Hayes, 2009; Hayes & Rockwood, 2017). And conceptually, this is partially what one would expect. Because there is, in most cases, also a direct effect of pressure that would lead people to *engage in* the pressured action, it is unsurprising that a straightforward backfiring effect does not always directly occur. However, whether in a particular moment or measurement the simple direct backfiring of a political pressure occurs, our approach suggests there is *always* a psychological cost behind the scenes – a seed that is waiting to blossom into outright deviance. And the evidence of an indirect effect of political pressure on rejection of laws *through* contamination validates that hypothesis.

In addition, the present results only apply to situations where observers perceive a consensus in favor of an environmental policy. We cannot infer from these results that political pressure would necessarily produce psychological contamination – and thus reduce support for environmental policies via contamination – unless there were also a perceived existing consensus in its favor.

While in one sense this limits the scope of these results, we intentionally narrowed our focus to situations with perceived consensus because this is a vital link in the understanding of long-term pro-environmental change. This scope is not just limited to propagating the consensus of some expert group (although that is often important, as in the case of scientists and climate change), but also applies more broadly to the long-term viability of cultural change. Although there is no doubt that top-down pressures exert direct effects on cultural change (e.g., Conway et al., 2014; Conway et al., 2017; Conway & Schaller, 2007), nonetheless, long-term cultural change invariably requires perpetuated consensus among large groups of people (for discussions and evidence, see Conway et al., 2006; Conway & Schaller, 2007). Because one of the mechanisms by which consensus emerges and is perpetuated is through the influence that consensus *itself* has on observers (see Conway et al., 2009; Conway & Schaller, 2007), it is vital to understand contexts where such consensus is perceived. Indeed, the importance of perceived consensus is underscored by the fact that perpetuating descriptive accounts of pro-environmental consensus has consistently been discussed in practical recommendations for how to produce lasting change across multiple environmental domains (e.g., Cialdini, 2003; Ding et al., 2011; Fornara et al., 2011; Gifford, 2011; Lewandowsky et al., 2013; van der Linden, Leiserowitz, et al., 2015). Thus, although Studies 2 and 3 (unlike Study 1) do not map directly on to a current, specific consensus figure, they do illustrate the potential pitfalls of political pressure for undermining the positive effect that a growing perceived consensus may have.

That is not to say that some of the processes discussed here would

necessarily require such an emerging consensus to operate. Indeed, conceptually, the two forms of contamination discussed here are likely in different categories in this regard. While informational contamination is more directly tied to the emerging consensus, emotional forms of contamination such as reactance can occur regardless of the presence of an existing consensus (see, e.g., Conway & Schaller, 2005). However, we cannot directly infer beyond the scope of the present studies, which were intentionally limited to situations with perceived consensus.

Finally, consideration of the different forms of contamination highlights another factor. In Study 1, participants were asked about a group that they likely do not view themselves a (direct) member of, whereas for Studies 2 and 3, participants were asked to imagine themselves *part of* the group in question. From the present perspective, psychological contamination can happen in both instances, and thus this varied array of evidence helps provide additional support for the psychological contamination perspective highlighted here. It is worth noting, however, that we might expect that, whereas informational contamination (which can occur on *any* consensus and not just for one's own group) would operate in both circumstances, emotional contamination would be more likely to operate when one's own group is involved. Thus, had we measured both forms in Study 1, we might expect less reactance in Study 1 than informational contamination – and in general we would expect reactance to operate in a manner proportional to the degree that people felt emotionally invested in the group outcome.

12.3. Concluding thoughts: Moving beyond ideology

There is a large need for social psychological approaches to environmental issues (see Pearson et al., 2016). For example, there is a tendency among climate scientists to assume that climate change skepticism is a largely *ideological* phenomenon. This is partially for good reason: Those on the right are far more likely to be skeptical of climate science than those on the left.

And yet our results (like other recent results that evaluate the communication properties of pro-environmental persuasions, e.g., Skurka, Niederdeppe, Romero-Canyas, & Acup, 2018) suggest that more may underlie the apparent ineffectiveness of (for example) climate scientists' consensus in moving beliefs than mere ideological biases. There may in fact be a reaction to such consensus at a deeper level. Although the present results do not draw a perfect direct line from political pressure to environmental policies, they do at least give us reason to suspect that heavy-handed political pressure to endorse environmental policies may, in the end, contribute to skepticism of the consensus that in many cases drove the creation of the policies in the first place.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jenvp.2019.02.001. Datafiles with the original data can be accessed at http://hs.umt.edu/politicalcognition/Data%20Repository.php.

References

Altemeyer, R. A. (1996). *The authoritarian spectre*. Cambridge: Harvard University Press.

Berger, J. A., & Heath, C. (2005). Idea habitats: How the prevalence of environmental cues influences the success of ideas. *Cognitive Science, 29*, 195–221.

Cavalli-Sforza, L. L. (1993). How are values transmitted? In M. Hechter, L. Nadel, & R. E. Michod (Eds.). *The origin of values* (pp. 305–317). New York: Aldine De Gruyter.

Chan, L., & Conway, L. G., III. (2018). Autocratic government moderates the relationship between culture and legal restriction. *Journal of Cross-Cultural Psychology*. https://doi.org/10.1177/0022022118793538 Advance online publication.

Cialdini, R. B. (2003). Crafting normative messages to protect the environment. *Current Directions in Psychological Science, 12*(4), 105–109.

Clifford, S., Jewell, R. M., & Waggoner, P. D. (2015). Are samples drawn from Mechanical Turk valid for research on political ideology? *Research and Politics*, 1–9. https://doi.

org/10.1177/2053168015622072 October–December 2015.

Conway, L. G., III, Bongard, K., Plaut, V. C., Gornick, L. J., Dodds, D., Giresi, T., et al. (2017). Ecological origins of freedom: Pathogens, heat stress, and frontier topography predict more vertical but less horizontal governmental restriction. *Personality and Social Psychology Bulletin, 43*, 1378–1398. https://doi.org/10.1177/0146167217713192.

Conway, L. G., III, Gornick, L. J., Houck, S. C., Anderson, C., Stockert, J., Sessoms, D., et al. (2015). Are conservatives really more simple-minded than liberals? The domain specificity of complex thinking. *Political Psychology*. https://doi.org/10.1111/pops.12304.

Conway, L. G., III, Houck, S. C., & Gornick, L. J. (2014). Regional differences in individualism and why they matter. In P. J. Rentfrow (Ed.). *Geographical psychology: Exploring the interaction of environment and behavior (pp. 31–50)*. Washington, DC: American Psychological Association.

Conway, L. G., III, Houck, S. C., Gornick, L. J., & Repke, M. A. (2016). Ideologically-motivated perceptions of complexity: Believing those who agree with you are more complex than they are. *Journal of Language and Social Psychology, 35*, 708–718.

Conway, L. G., III, Repke, M. A., & Houck, S. C. (2017). Donald Trump as a cultural revolt against perceived communication restriction: Priming political correctness norms causes more Trump support. *Journal of Social and Political Psychology, 5*, 244–259.

Conway, L. G., III, Salcido, A., Gornick, L. J., Bongard, K. A., Moran, M., & Burfiend, C. (2009). When self-censorship norms backfire: The manufacturing of positive communication and its ironic consequences for the perceptions of groups. *Basic and Applied Social Psychology, 31*, 335–347.

Conway, L. G., III, & Schaller, M. (1998). Methods for the measurement of consensual beliefs within groups. *Group Dynamics: Theory, Research, and Practice, 2*, 241–252.

Conway, L. G., III, & Schaller, M. (2005). When authority's command backfire: Attributions about consensus and effects on deviant decision-making. *Journal of Personality and Social Psychology, 89*, 311–326.

Conway, L. G., III, & Schaller, M. (2007). How communication shapes culture. Book chapter to appear. In K. Fiedler (Ed.). *Frontiers of social psychology: Social communication*. New York: Psychology Press.

Cook, J., & Lewandowsky, S. (2016). Climate change belief polarization using Bayesian networks. *Topics in Cognitive Science, 8*, 160–179. https://doi.org/10.1111/tops.12186.

Cook, J., Oreskes, N., Doran, P. T., Anderegg, W. R., Verheggen, B., Maibach, E. W., et al. (2016). Consensus on consensus: A synthesis of consensus estimates on human-caused global warming. *Environmental Research Letters, 11*(4), 048002.

Crandall, C. S., & Sherman, J. W. (2016). On the scientific superiority of conceptual replications for scientific progress. *Journal of Experimental Social Psychology, 66*, 93–99.

Darlington, R. B., & Hayes, A. F. (2017). *Regression analysis and linear models: Concepts, applications, and implementation*. New York: Guilford Press.

Ding, D., Maibach, E. W., Zhao, X., Roser-Renouf, C., & Leiserowitz, A. (2011). Support for climate policy and societal action are linked to perceptions about scientific agreement. *Nature Climate Change, 1*, 462–465.

Doran, P. T., & Zimmerman, M. K. (2009). Examining the scientific consensus on climate change. *Eos, 90*(3), 22–23.

Dunlap, R. E., & McCright, A. M. (2010). Climate change denial: Sources, actors and strategies. In C. Lever-Tracy (Ed.). *Routledge handbook of climate change and society* (pp. 240–259). London: Routledge.

Dunlap, R. E., & McCright, A. M. (2011). Organized climate change denial. In J. S. Dryzek, R. B. Norgaard, & D. Schlosberg (Eds.). *The Oxford handbook of climate change and society (pp. 144–160)*. Oxford: Oxford University.

Fein, S. (1996). Effects of suspicion on attributional thinking and the correspondence bias. *Journal of Personality and Social Psychology, 70*, 1164–1184.

Fein, S., Hilton, J. L., & Miller, D. T. (1990). Suspicion of ulterior motivation and the correspondence bias. *Journal of Personality and Social Psychology, 58*, 753–764.

Feldman, L. (2016). *The effects of network and cable TV news viewing on climate change opinion, knowledge, and behavior, Oxford Research Encyclopedia of Climate Science*. Retrieved 1 Nov. 2018, from http://oxfordre.com/climatescience/view/10.1093/acrefore/9780190228620.001.0001/acrefore-9780190228620-e-367.

Fornara, F., Carrus, G., Passafaro, P., & Bonnes, M. (2011). Distinguishing the sources of normative influence on proenvironmental behaviors: The role of local norms in household waste recycling. *Group Processes & Intergroup Relations, 14*(5), 623–635.

Gifford, R. (2011). The dragons of inaction: Psychological barriers that limit climate change mitigation and adaptation. *American Psychologist, 66*(4), 290.

Guber, D. (2012). A cooling climate for change? Party polarization and the politics of global warming. *American Behavioral Scientist, 57*(1), 93–115.

Hayes, A. F. (2009). Beyond Baron and Kenny: Statistical mediation analysis in the new millennium. *Communication Monographs, 76*, 408–420.

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis*. New York: The Guilford Press.

Hayes, A. F., & Rockwood, N. J. (2017). Regression-based statistical mediation and moderation analysis in clinical research: Observations, recommendations, and implementation. *Behaviour Research and Therapy, 98*, 39–57.

Houck, S. C., Conway, L. G., III, & Gornick, L. J. (2014a). Automated integrative complexity: Current challenges and future directions. *Political Psychology, 35*, 647–659.

Houck, S. C., Conway, L. G., III, & Repke, M. A. (2014b). Personal closeness and perceived torture efficacy: If torture will save someone I'm close to, then it must work. *Peace and Conflict, 20*, 590–592. https://doi.org/10.1037/pac0000058.

Knowles, E. S., & Linn, J. A. (2004). The importance of resistance to persuasion. In E. S. Knowles, & J. A. Linn (Eds.). *Resistance and persuasion (pp. 3–9)*. Mahwah, NJ: Mahwah Press.

Lewandowsky, S., Gignac, G. E., & Vaughan, S. (2013). The pivotal role of perceived scientific consensus in acceptance of science. *Nature Climate Change, 3*, 399–404.

van der Linden, S., Leiserowitz, A., Feinberg, G. D., & Maibach, E. W. (2015). The

scientific consensus on climate change as a gateway belief: Experimental evidence. *PLoS One, 10*(2), https://doi.org/10.1371/journal.pone.0118489.

van der Linden, S., Leiserowitz, A., Rosenthal, S., & Maibach, E. (2017). *Global Challenges, 1*. https://doi.org/10.1002/gch2.201600008.

van der Linden, S., Maibach, E., & Leiserowitz, A. (2015). Improving public engagement with climate change: Five "best practice" insights form psychological science. *Perspectives on Psychological Science,* 1–6. https://doi.org/10.1177/1745691615598516.

Maibach, E. W., Leiserowitz, A., Roser-Renouf, C., Mertz, C. K., & Akerlof, K. (2011). *Global warming's Six Americas screening tools: Survey instruments; instructions for coding and data treatment; and statistical program scripts.* New Haven, CT: Yale University and George Mason University. Yale Project on Climate Change Communication.

Maio, G. R., & Esses, V. M. (1998). The social consequences of Affirmative Action: Deleterious effects on perceptions of groups. *Personality and Social Psychology Bulletin, 24,* 65–74.

McCright, A. M., Charters, M., Dentzman, K., & Dietz, T. (2016). Examining the effectiveness of climate change frames in the face of a climate change denial counter-frame. *Topics in Cognitive Science, 8,* 76–97.

McCright, A. M., & Dunlap, R. E. (2011). The politicization of climate change and polarization in the American public's views of global warming, 2001–2010. *Sociological Quarterly, 52*(2), 155–194.

Milgram, S. (1974). *Obedience to authority.* New York: Harper and Row.

Mook, D. G. (1983). In defense of external invalidity. *American Psychologist, 38,* 379–387.

Pearson, A. R., Schuldt, J. P., & Romero-Canyas, R. (2016). Social climate science: A new vista for psychological science. *Perspectives on Psychological Science, 11,* 632–650.

Pratto, F., Sidanius, J., Stallworth, L. M., & Malle, B. F. (1994). Social dominance orientation: A personality variable predicting social and political attitudes. *Journal of Personality and Social Psychology, 67*(4), 741–763.

Ranney, M. A., & Clark, D. (2016). Climate change conceptual change: Scientific information can transform attitudes. *Topics in Cognitive Science, 8,* 49–75. https://doi.org/10.1111/tops.12187.

Saad, L., & Jones, J. M. (2016). *U.S. concern about global warming at eight-year high.* Gallup. Retrieved from: http://www.gallup.com/poll/190010/concern-global-warming-eight-year-high.aspx, Accessed date: 2 February 2017.

Skurka, C., Niederdeppe, J., Romero-Canyas, R., & Acup, D. (2018). Pathways of influence in emotional appeals: Benefits and tradeoffs of using fear or humor to promote climate change-related intentions and risk perceptions. *Journal of Communication.* https://doi.org/10.1093/joc/jqx008.

Stroud, N. J. (2011). *Niche news: The politics of news choice.* New York: Oxford University Press.

Vainio, A., Makiniemi, J.-P., & Paloniemi, R. (2014). System justification and the perception of food risks. *Group Processes & Intergroup Relations, 17,* 509–523.